

Guideline to daylight simulations in IES-VE with MicroShade®

This is a guideline to building simulations with MicroShade® in IES-VE. IES-VE is a building simulation software for analyzing buildings and installations developed by IES in United Kingdom. IES-VE is used for designing and simulating buildings and calculates, among other things, the annual energy consumption and daylight conditions for a given building. IES-VE contains several applications, one of them is RadianceIES. RadianceIES uses the daylight calculation tool Radiance as a calculation core and can calculate several daylight parameters for one or multiple rooms.

This guideline is intended for daylight simulations with MicroShade® in the RadianceIES application for IES-VE. For further questions regarding RadianceIES or IES-VE simulations, please contact IES on their support page <http://www.iesve.com/support/contact>. For questions regarding MicroShade®, please contact us on support@microshade.dk.

For building simulations in IES-VE with MicroShade® please see our [guideline](#) to building simulations in IES-VE.

Simulation of MicroShade® in RadianceIES

About MicroShade®

MicroShade® is a highly effective shading product containing microscopic shading lamellas. The shading efficiency depends on the incidence angle of the sun on the lamellas. When the sun is high in the sky during the summer, MicroShade® provides the strongest shading and during winter when the sun is low more heat is allowed into the building. Similarly, the shading efficiency also varies during the course of the day due to the different positions of the sun in the morning, noon and evening.

Daylight metrics

It is recommended to use either spatial Daylight Autonomy (sDA) or Useful Daylight Illuminance (UDI) as the evaluation metric when simulating daylight conditions in a room or building. The RadianceIES application for IES-VE can calculate these daylight metrics under the "Advanced" tab in "Simulate".

sDA describes the percentage of floor area that receives daylight above a limit, usually 300 or 500 lux, for at least 50% of the annual occupied hours.

UDI describes how many hours, workhours or percentage of the year where the daylight levels are within the desired interval (usually 100-3000 lux). Lower illuminance levels requires artificial light and higher illuminance levels causes a risk of overheating and glare.

Usage

In RadianceIES a MicroShade® glazing can be simulated with a BSDF file for the glazing containing MicroShade®. BSDF files for standard 2- and 3-layer glazings with MicroShade® can be downloaded from this guideline and imported into RadianceIES in the "Surface Properties" tab for the window.

In case you need a special glazing configuration, it is possible to create a special glazing containing MicroShade® following our general guideline on [daylight simulations with MicroShade®](#).

MicroShade® BDF files

BDF (Bi-Directional-Scattering-Function) files of MicroShade® have been developed together with the Laboratory of Performance-Integrated Design at EPFL in Lausanne Switzerland. The models have been validated against angle dependent transmittance measurements.

The BDF files developed at EPFL only contains the MicroShade® layer and therefore they need to be combined with a glazing in order to get a BDF file for a MicroShade glazing. Standard two and three layer glazings with MicroShade® have been made and are available for download below.

To download a BDF file, click on the appropriate MicroShade® type and glazing below.

MS-A (Used in south facing facades)

- [3 layer glazing](#)
- [2 layer glazing](#)

MS-D (Used in south, east and west facing facades)

- [3 layer glazing](#)
- [2 layer glazing](#)

MS-RS (Used in roofs with inclination <30°)

- [3 layer glazing](#)
- [2 layer glazing](#)

MS-RW (Used in roofs with inclination between 30° and 80°)

- MS-RW 90 - MS-RW rotated 90°
 - [3 layer glazing](#)
 - [2 layer glazing](#)
- MS-RW 180 - MS-RW rotated 180°
 - [3 layer glazing](#)
 - [2 layer glazing](#)
- MS-RW 270 - MS-RW rotated 270°
 - [3 layer glazing](#)
 - [2 layer glazing](#)

2-layer glazing

4 mm Planiclear + MicroShade + 16 mm argon + 4 mm Planitherm XN

3-layer glazing

4 mm Planiclear + MicroShade + 16 mm argon + 4 mm Planitherm XN + 16 mm argon + 4 mm Planitherm XN

A rotation of MicroShade® is normally done to optimize the g-value. For vertical facades, MicroShade® are never rotated, while MicroShade® in roof windows can be rotated depending on the orientation and inclination of the roof. Rotation should be considered for orientations between northeast (45°) and northwest (315°) for all roof windows. Please contact MicroShade A/S at support@microshade.dk in these cases, to get the right rotation angle.

For more information on which MicroShade® type to choose for your project, please see the selection guidelines on www.microshade.dk/downloads-software, or contact us at support@microshade.dk.

Setting up a simulation in RadianceIES with MicroShade®

Getting started

1. In IES-VE, create your model in ModelIT, add windows and open the lighting application RadianceIES
2. Select the "Surface properties" tab. This is where you will add the MicroShade® glazing BSDF file.
3. Press "Add BSDF" in the "Surface properties" tab.

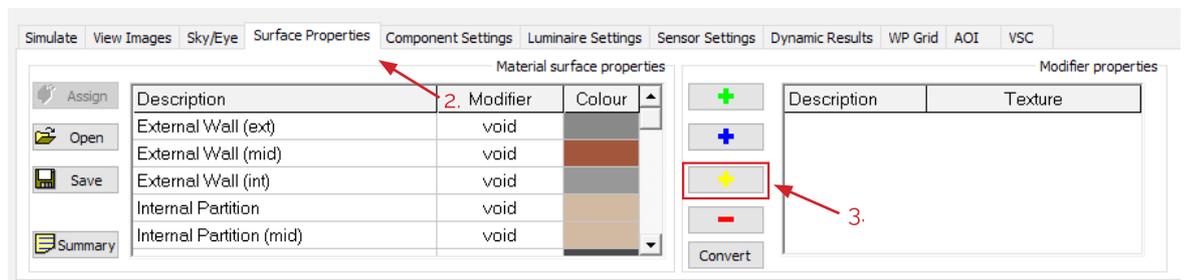


Fig. 1: Add a BSDF file under "Surface Properties"

4. In the "Description" list under the "Surface properties" tab, navigate to "External glazings", and select the MicroShade® modifier instead of "void". This will now be the BSDF modifier for all the external glazings in the model.

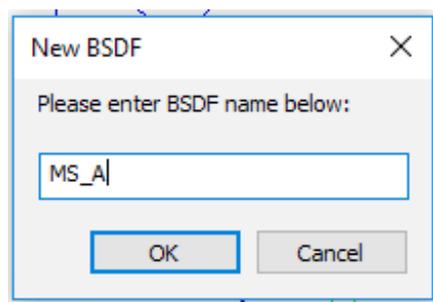


Fig. 2: Give the BSDF file a name

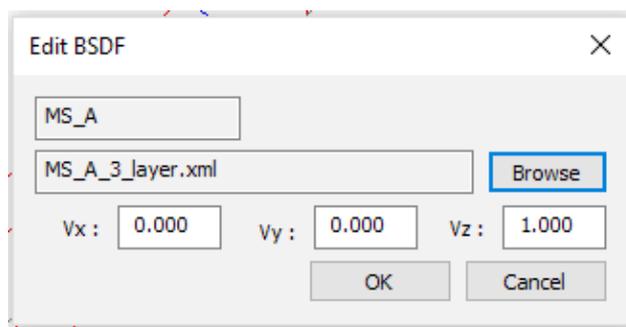


Fig. 3: Navigate to the directory of the BSDF file and select it

- In the "Description" list under the "Surface properties" tab, navigate to "External glazings", and select the MicroShade® modifier instead of "void". This will now be the BSDF modifier for all the external glazings in the model.

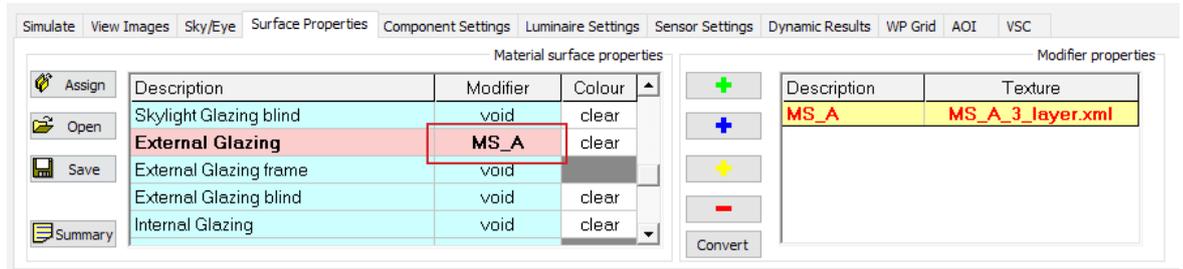


Fig. 4: In this example a MS-A BSDF file has been selected as a modifier for the external glazings of the model

More than one type of MicroShade®

If the model includes different kinds of MicroShade® types or external glazings, complete these steps:

- Select the façade with the glazings you want to edit and click on "Assign".

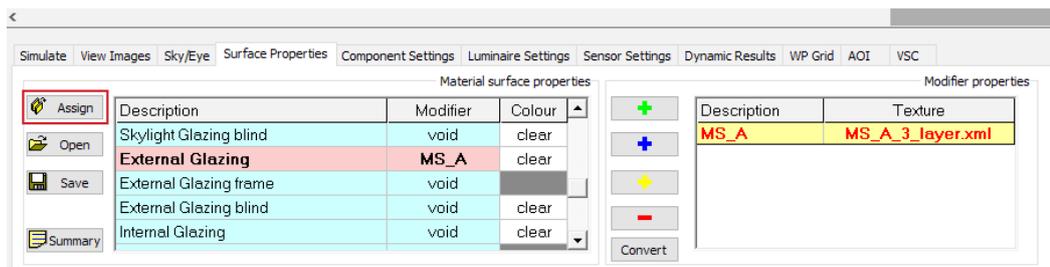
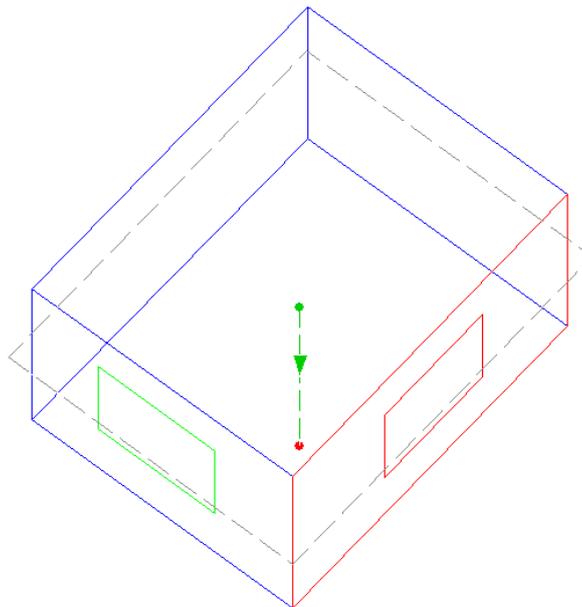


Fig. 5: In this scenario, a MS-A BSDF file has been added to one window, and a MS-D BSDF file must be added in the other window. Select the façade where the other MicroShade® type should be inserted and click on "Assign"

2. Select the appropriate glazing surfaces from the list in "Model surface(s) of the following type". Click on "New" and create a new surface type. Select the surface you just created in "Possible replacement surface type" and click on "Replace". The windows on this wall now have their own surface type. Press "Close".

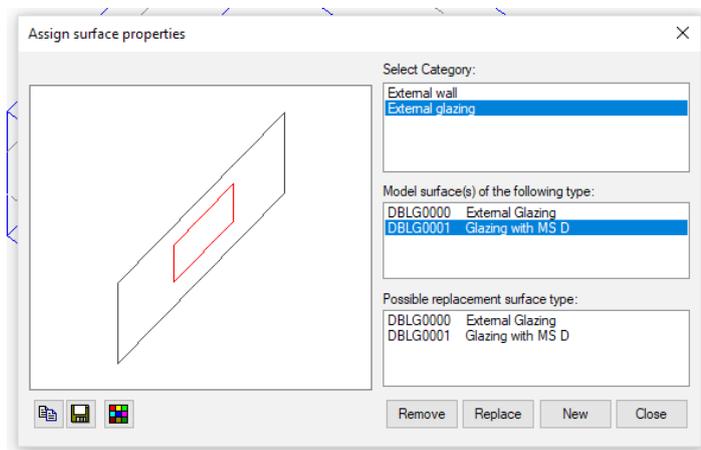


Fig. 6: Replace an existing surface type with a new surface type

3. A new material has now been created in "Material surface properties". Assign a new BSDF file as a modifier, by following the procedure for adding BSDF-files, as mentioned earlier.

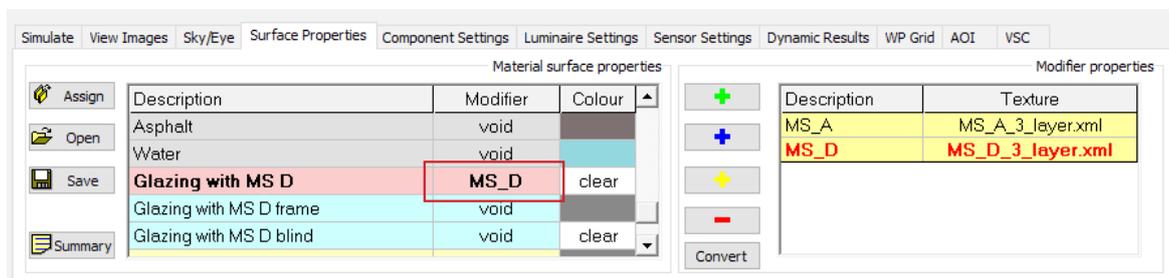


Fig. 7: In this example, a MS-D BSDF file has been used as the modifier for the newly created surface material

If the simulation includes different kinds of MicroShade® types or glazings in the same façade, follow the same procedure as mentioned above, but instead of initially selecting a wall and clicking on "Assign", select the individual window in the 3D view and then click "Assign".